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FROM

EXPERIMENT STATIONS

SEASON 1951-52

TANGANYIKA TERRITORY
LAKE PROVINCE

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TANGANYIKA TERRITORY.
LAKE PROVINCE.

PROGRESS REPORT FOR THE SEASON 1951-52

BY

J. E. PEAT, J. M. MUNRO and M. H. ARNOLD.

COTTON, UKIRIGURU.

Planting: 16th November to 4th January.
Picking: April-August.
Legal uprooting date: 7th September.
Rainfall for the period 1st October to 30th June: 52 inches.

Meteorology.—The rainfall for the season exceeded anything experienced at Ukiriguru since recording started in October 1931; the previous maximum for the period October to June was 47·63 inches (in 1946-47). The highest rainfall previously recorded for 24 hours was 2·62 inches (in March 1938) but in the present season 3·65 inches fell on 8th November 1951. Following 11·88 inches in November, in December there was rain on 24 days, totalling over 12 inches for the month.

There was a dry period of four weeks in January-February. From February till the end of May rainfall was adequate and well-distributed.

Staff.—Mr. J. M. Munro was on vacation leave from mid-June till early November 1952. Mr. R. Smith left on transfer to Nyasaland on 15th September. Mr. M. H. Arnold arrived on first appointment on 4th September.

Mr. J. E. Peat attended the Namulonge Advisory Board Meetings in November 1951 and November 1952; he visited Southern Rhodesia at the request of the Cotton Research and Industry Board of Southern Rhodesia in December 1951; and he attended the second meeting of the E.A.A.F.R.O. Specialist Committee on Plant Breeding in Kenya in September 1952.

Ukiriguru Laboratories.—The Ukiriguru laboratories were opened on 9th May 1952, by the Member for Agriculture and Natural Resources, the Honourable A. E. Trotman. A message was read from His Excellency the Governor, Sir Edward Twining, G.C.M.G., who very much regretted that he had been prevented by illness from being present at the opening.

General Introduction.

The Lake Province cotton production for the 1951-52 season will be around 71,000 to 72,000 bales. There has been loss by fires at seed cotton stores; and in some areas there was still a certain amount of seed cotton on the plants when they were uprooted. This production is more than 20,000 bales greater than the previous record production in 1940-41, and 30,000 bales greater than the production of the previous two seasons. The cotton acreage is reported by the Regional Assistant Director of Agriculture, Mwanza, to be only about 9% greater than in the 1950-51 season. With early rains, much of the cotton was early planted; but, in some areas, January planted cotton, due to a dry January, did not germinate until February and was thus in effect late planted. The very heavy November-December rains flooded the low lands, and from such lands little cotton was produced.

The Ukiriguru cotton yields were poorer than in many years. In contrast with this some of the yields around the Lake shore were very good indeed. Given sustained interest and continuing acreage, and given further cultural and seed improvements, still greater production should be possible, though there must be setbacks in some years.

Part of this season's increased production may reasonably be claimed for the improved seed stocks; there was no damage by jassid. Part of the yield increase is due to some improvement in planting technique, and to the early planting, largely through the activities of the Departmental and Lake Province Cotton Committee staffs.

Of the twelve ginneries operating in the Lake Province, this year seven are ginning around 7,000 bales each.

The season has been a difficult one for the food crops in the cotton growing areas, but it is essential to appreciate that the record cotton crop has not been produced at the expense of food production. Rather, it is fortunate that the cash from the big cotton crop has allowed the purchase of food from more fortunate areas.

The very heavy November-December rains made cultivation in the heavy lands impossible, owing to continuous flooding: important food crop planting there was not possible.

Great loss to bulrush millet and sorghum was suffered as a result of quite exceptional attacks of grain eating weaver birds, the Diochs, *Quelea spp.* On Ukiriguru, where probably more attention can be given to bird scaring than by most African cultivators, bulrush millet yields were miserable. Near the Ukiriguru hill (tree covered) yields were under 50 lb./acre, and in more open areas 120-300 lb./acre—at the worst a starvation yield, and at the very best a half crop. In spite of continuous bird scaring the losses suffered by the Botanist on his sorghum lots were very heavy.

A third factor reducing food production was heavy stalk-borer loss in sorghum.

The tractor work of the Lake Province Cotton Committee has been held up, partly by difficulties in getting delivery of essential equipment (which is now available for the 1952-53 season). Work on the heavy soils was at its most difficult in a season of exceptionally heavy rains. It is emphasised that this mechanization approach to peasant African agriculture is experimental; the lessons being learned are many.

1952-53 Cotton Planting. The early rains in the Lake Province have been very poor. At the time of writing (January 1953) little cotton has been planted and little food, though now, with the onset of rain, land work is in full progress. Everything points to a reduced cotton acreage and to late planting. It is early to say what reduction in the cotton crop may have to be faced, but a reduction for this season would seem to be probable.

One important point that requires following up is a comparison of the results from late planting in years where the early rains have been poor, with the results from late planting in years where the early rains have been heavy—tied up with the leaching of accumulated soil nitrates by heavy early rains.

Summary of the Main Experimental Results.

Three years' "tumbledown" fallow has again been shown to restore fertility better than a planted grass fallow, and to do so in the first cropping year.

Responses to three years under different resting crops are still evident six and eight years later.

Responses to organic manuring have fallen below the 5% significance level in the eighth season after application, but this was with millet as the indicator crop, in a very difficult year for millet growing.

Nitrogen applied between January and March showed no difference in response to time of application. The effect of nitrogen was less in the presence of organic manure.

Tie-ridging, in an exceptionally wet season, may have depressed yields slightly in comparison with ridges not tied.

Preliminary trials of seed treatment against bacterial blight infection showed that a considerable degree of control was possible by this means. Stem lesion counts showed, however, that young seedlings from acid-treated seed were quickly infected where cotton had been

grown the previous season, stressing the importance of trash-borne infection and its control by adequate rotation of crops. Two seasons under a grain crop seem to be the minimum period required to control trash-borne infection.

Uk48 and Uk51 have yielded better than Uk46 in extensive trials throughout the Province.

By growing cotton during the dry season, a generation has been gained in the programme of crossing with Albar 51.

General Account of the Work for the Season.

Husbandry.

Land Resting.—The residual effects of 3 years of elephant grass, *Cynodon, Hyparrhenia,* pigeon pea, and cassava are still apparent in the sixth and eighth years since the treatment residues were dug in. These trials were planted this season to bulrush millet; in all trials under this crop, plant weights were taken as a measure of yield, since much of the grain was taken by birds.

Table I.

Resting Crop Trial.

Ukiriguru—Hill sand—Trial (5).

6 Blocks of 14 plots (7 cotton : 7 millet) of 1/35·6 acres. 5 foot ridges, 2 rows at 18″ spacing, 2 plants per hole. Planted 13-15th December 1951. Cropping Rotation—2 years cotton : 2 years millet.

First Cropping Year.

Three Years Resting Cycle 1948-49 *to* 1950-51.	*First Indicator Crops.*			
	Cotton.		*Millet.*	
Treatments.	*Yield seed cotton lb. per acre.*		*Yield stalks and heads lb. per acre.*	
Annual cropping, residues grazed ...	373	=100%	1981	=100%
Annual cropping, residues carried off ...	407		1720	
Cassava, weeded first year only	624	160	2763	150
3 years " tumbledown " fallow—grazed	695	178	2971	161
3 years planted grass fallow—grazed ...	575	152	2111	107
3 years planted grass fallow—not grazed	613		1856	
3 years planted grass fallow—undersown with *Tephrosia* and *Crotalaria*—grazed	630	162	2265	123
Sign. Diff. (P=·05)	122	31%	457	25%
S.E.	±42·3		±159	

The comparative effects of three years of "tumbledown" and planted fallows in Trial (6) were discussed in last year's report (p. 49). These results are confirmed by Trial (5) (see Table 1). Here, again, the "tumbledown" fallows were predominantly *Tridax repens.* In the first cropping year, these plots were outstanding in growth all through the season; the cassava plots, which had a strong weed growth in the

second and third years, were almost as good; planted grasses benefited the subsequent cotton crop, but the effect on millet was less marked. The effects of grazing and the inclusion of legumes in the planted grass mixture are still uncertain.

Trial (5) differs from Trial (6) in that the "tumbledown" fallow plots have done well in the first cropping year. The first year depression in yield in Trial (6)—1948-49—was attributed to competition from *Tridax,* self-sown from the fallow period; special attention was paid to weed control this season.

Manuring and Fertilisers.—The effects of organic manures applied in 1944-45 are still apparent in the eighth season after application. This experiment was planted with bulrush millet; the plant weights from the different treatments follow the same order as in previous years, but the differences are not significant. It was a bad year for bulrush millet. Ninth year responses, if any, are to be measured in 1952-53 with cotton as the indicator crop.

TABLE 2.

NPD EXPERIMENT.

Ukiriguru—Hill sand—Trial (9).

Main plots split to give 3 × 2 factorial, testing all combinations of:—

(Main plots)	n_0, n_1	0, 250 lb. sulphate of ammonia per acre.
(Split plots)	d_0, d_1	0, 6 tons compost per acre.
	p_0, p_1, p_2	0, 45, 90 lb. triple supers per acre.

6 replications of 12 plots, each 1/69·7 acres. Compost and phosphate applied 6-8th December 1950; nitrogen applied 19-20th March 1951 and 12th and 28th March 1952. 5 foot ridges, 2 rows at 18″ spacing, 2 plants per hole. Planted 12th November 1951.

FIRST RESIDUAL YEAR—NITROGEN RE-APPLIED.

Mean yields: seed cotton lb. per acre.

n_0	549	398	p_0	468	d_0	460
n_1	545	572	p_1	541	d_1	572
	(a)	(b)	p_2	537		
S.E.	±49·5			±19·3		±15·7

Interactions.

np_2	−28	p_2d	−22	nd	+8
S.E.	±27·2		±27·2		±22·2

Treatment yields.

	(1)	d	n	nd
p_0	344	466	453	652
p_1	476	559	570	606
p_2	448	556	530	660
S.E.	p and d treatments			±38·4
	n treatments			±85·6

(a) nitrogen applied 12th March; Reps. I, V, VI.
(b) nitrogen applied 28th March; Reps. II, III, IV.
(1) Control. No applications.

In Trial (9) yields were low, partly the result of insect damage to seedlings, and bacterial blight later in the season. The residual effects, (Table 2) of both phosphate and organic manure are significant, with no obvious difference between 45 and 90 lb./acre of triple supers. Last season only the double rate of application was effective. The response to nitrogen is puzzling. Three replications were manured on 12th March, and the other three sixteen days later; the former showed no effect either in leaf colour or final yield, but the latter showed both, and the increase in yield was significant. There may have been an error in the first dressing, but this cannot be established.

Trial (23) was designed to discover the optimum time to apply nitrogen. Earlier trials with nitrogen applied to cotton at planting had given negligible responses; on the other hand, large responses had been obtained when nitrogen was applied as a top-dressing about the time of flowering. Table 3 shows that in this season there was little difference between times of application ranging from January to March,

TABLE 3.

NPD EXPERIMENT.

Ukiriguru—Hill sand—Trial (23).

4 replications of 2 × 2 factorial, with split plots of 1/194 acres giving 5 nitrogen treatments. Compost and phosphate applied 17-18th December 1951. 5 foot ridges, 2 rows at 18″ spacing, 2 plants per hole. Planted 29th December 1951.

p_0, p_1	0, 90 lb. triple supers per acre.
d_0, d_1	0, 6 tons compost per acre.
n	250 lb. sulphate of ammonia per acre.

YEAR OF APPLICATION.

Mean yields seed cotton lb. per acre.

Main plots:	(1)	p	d	pd	S.E.
	1044	989	1184	1062	±69·2

Interaction pd −34

Sub-plots:	*Time of application of nitrogen.*				
	nil	Full rate 4 Jan.	Full rate 18 Mar.	Half rates 7 Feb. 18 Mar.	Half rates 18 Mar. 9 Apr.
	825	1156	1144	1169	1059

Sign. Diff. (P = ·05) ... 105. S.E. ... ±37·0

Interaction (n = mean of 4 treatments).

np ... ... +18 not significant.

nd ... ... −82 almost significant at P = ·05.

	(1)	d
(1)	707	945
n	1095	1170

(1) Control. No applications.

but a slight falling off when applied as late as April. It was unfortunate that the trial could not be planted until the end of December, after two months of exceptionally heavy rain. The fact that there was a

four weeks' dry period in January-February might explain the good response from the January application.

In both trials where nitrogen was applied there was a suggestion of a depression in the first picking compared with the controls, but progressive increases in the subsequent pickings.

The response to organic manure in the absence of nitrogen was of the usual order, but there was no response to phosphate in Trial (23).

The super-raw phosphate applied on a large scale in two areas of the Province gave no striking results. The practical difficulty of organising large scale application on suitable soils, with control areas for comparison, is considerable. Delivery to the chosen areas was late owing to delays in lake and road transport, and the distribution was consequently rather hurried.

A further issue of superphosphate (40% sol. P_2O_5) is being made in the coming season; sections will be left unmanured for comparison. Sulphate of ammonia, which was delivered too late for distribution in 1952, will also be issued (1) to those cultivators who were satisfied that the super-raw phosphate was effective; and (2) to some of those receiving superphosphate in the coming season.

Soil samples were taken from areas where distribution has been or will be made. We are indebted to Dr. H. F. Birch of the East African Agricultural and Forestry Research Organisation for analyses of these samples, which showed that while the percentage of base saturation was reasonably high, there was a deficiency of acid soluble phosphate. About these samples Dr. Birch wrote:—"Further support for the possibility of P response is given by the high sand low phosphate figures for the soils. Such soils are unlikely to contain much phosphate and are also unlikely adversely to affect by fixation the efficiency of the added phosphates. P responses may, therefore, be expected."

Four samples of soils from Ukiriguru were sent at the same time. These on analysis were similar to the samples taken elsewhere. Two were from the control plots of Trials (6) and (8).

	Ex. Bases. m.e./100g. soil						% Sat.			
	Ca.	Mg.	Mn.	K.	Na.	Total	H.	B.E.C.	B.E.C.	pH.
Trial (8) Control	0·88	0·29	0·061	0·190	—	1·40	0·4	1·8	77·7	5·80
Trial (6) Control	0·67	0·70	0·024	0·313	—	1·70	0·6	2·3	73·9	6·20

				Mechanical Analyses				*Phosphates p.p.m. P_2O_5*		
	% C. Uncorr.	% N.	C : N. Ratio	% Sand	% Silt	% Clay	% Organic Matter	Acid Sol.	Acid Sol.	Ads.
Trial (8) Control	0·20	0·020	13·5	87·2	1·8	4·3	0·4	40	6	2
Trial (6) Control	0·29	0·035	11·1	80·9	10·0	8·5	0·6	48	2	7

Ridging and Tying.—The cotton tie-ridged plots in the two Ukiriguru trials yielded slightly less than the untied plots; the differences were not significant. Cotton stalk weights were significantly

reduced on the tied plots in the absence of compost, but not when it was present.

At Lubaga, cotton yields were the same from tied and untied treatments. Another Lubaga trial planted with Dobbs sorghum showed a striking difference between flat and ridge cultivation; the yields were respectively 190 and 469 lb./acre of grain.

Rotation.—The Ukiriguru rotation trial has now completed the first cycle of 4 years. Cotton has had little effect on the succeeding millet crops, but this season cotton, following two years of millet, yielded 140 lb./acre more seed cotton than any of the other rotations in the trial (Table 4). It is thought that this was due largely to a reduc-

TABLE 4.

ROTATION TRIAL.

Ukiriguru—Hill sand—Trial (19).

6 blocks of 8 plots, each 1/48·4 acres. 5 foot ridges, 2 rows at 18″ spacing, 2 plants per hole. Cotton planted 13th November 1951; bulrush millet planted 21st January 1952.

FOURTH YEAR OF TRIAL.

C = Cotton. M = Bulrush millet.

Rotation	*Seed cotton lb. per acre*		*Rotation*	*Millet stalks & heads lb. per acre*
C: C: C: C:	412	= 100%	M: M: M: M:	1775
M: C: M: C:	448	109	C: M: C: M:	1695
C: M: M: C:	588	143	M: C: C: M:	1800
M: M: C: C:	424	103	C: C: M: M:	1720
Sign. diff. (P=·05)	110	27%		Not significant
S.E.	±36·6			±112

tion in secondary bacterial blight infection, by rotation. If this is so, it would appear that at least two seasons under grain are required to reduce the trash infection carry-over.

In a similar rotation trial at Lubaga, now in its third year, where sorghum replaces millet as the grain crop, there is no evidence that sorghum reduces the growth and yield of the following cotton crop, as, from observation, occurs on the Ukiriguru hill sands.

A year of clean weeded fallow at Lubaga on "ibushi" black loam has resulted in a lower yield of cotton in the following season. This is the first trial of this treatment, and the effects of "tumbledown" fallow are now under test there.

COTTON BREEDING.

Uk48 was multiplied in the Buchosa area of the Geita District. Uk51 was multiplied on just over 100 acres in Kome Island in the

Table 5.
Yield Results.
1952 Strain Trials.

	Ukiriguru Hill Trial.			*Ukiriguru "Mbuga" Trial*			*Lubaga "Ibushi" Trial*			*Ukiriguru (Nyashimba) Trials (Exhausted soil)*									*Ukiriguru (Nyihuji) Trial*		
	Yield seed cotton lb. per acre	*Ginning %*	*Lint % of Uk46*	*Yield seed cotton lb. per acre*	*Ginning %*	*Lint % of Uk46*	*Yield seed cotton lb. per acre*	*Ginning %*	*Lint % of Uk46*	*Yield seed cotton lb. per acre.*				*Ginning %*	*Lint % of Uk46*				*Yield seed cotton lb. per acre*	*Ginning %*	*Lint % of Uk46*
										A.	*B*	*C*	*D*		*A*	*B*	*C*	*D*			
Mx561	656	33·5	87	387	32·5	93	894	35·0	73	240	286	239	268	32·4	75	100	81	84	789	32·8	82
Uk46	710	35·5	100	386	35·0	100	1210	35·6	100	293	275	275	293	34·8	100	100	100	100	901	35·0	100
Uk48	804	35·7	114	431	35·3	113	1315	36·0	110	326	405	275	373	35·4	111	153	103	127	836	36·5	97
Uk51	859	35·2	120	443	36·3	116	1474	35·0	120	319	427	333	474	34·3	108	154	120	154	916	36·8	107
ex 5/57																					
7/7*	684	36·5	99	421	36·0	113	1170	36·0	98												
7/9*	779	36·5	113	429	35·5	113	1201	35·5	99												
7/14	773	36·8	113	395	36·8	107	1152	37·5	100												
9/10	766	37·2	113	428	37·3	119	1265	37·5	110	315@				36·3@	111@						
9/16	856	37·8	129	441	35·8	117	1241	37·8	109	340@				35·5@	117@						
ex 3/28																					
7/150*	768	35·8	109	389	35·0	101	1120	36·3	94		373+			35·7+		140+					
ex 7/150																					
9/102	766	36·5	111	367	36·0	98	1091	36·3	92												
9/107	754	36·5	109	374	35·5	99	1212	36·3	102												
ex 6/318																					
8/95	849	36·5	123	460	36·3	124	1165	37·0	100												
8/151	866	35·0	120	—	—	—	1077	37·0	92												
ex 6/320																					
7/278*	875	35·2	122	457	35·5	120	1230	37·8	108												
8/290*	896	34·5	123	510	33·5	127	1354	35·0	110			451†		34·2†			164†				
ex 6/322																					
8/341*	839	34·5	115	396	38·0	103	1133	36·0	95												
ex 4/86																					
9/117	756	39·0	117	393	38·0	110	1245	38·8	112												
Least sign diff (P = ·05)	107		16	60		16	191		16	75	84	89	85		26	33	33	30	222		25
Standard error	± 38			± 22			± 69			± 27	± 30	± 32	± 30						± 79		
% Grade 'C'		27			27			52						36						20	
Details of Trials Design Plot size	7 × 7 balanced lattice. 50 × 5 feet			7 × 7 balanced lattice. 50 × 6 feet.			7 × 7 balanced lattice 64 × 4 feet.			5 × 5 balanced lattices. 25 × 5 feet									5 ×5 balanced lattice 25 × 5 feet		
Planting date Spacing	19th November 1951. 5 foot ridges, 18" spacing. 2 plants per hole.			16th November 1951. 3 foot rows, 18" spacing. 1 plant per hole.			12th December 1951. 4 foot ridges, 18" spacing. 2 plants per hole.			28th November 1951. 5 foot ridges, 18" spacing. 2 plants per hole									29th December 1951 5 foot ridges, 18" spacing. 2 plants per hole		

* Component strains of Uk51.
@ Best 1950 selections from 9/10 and 9/16 respectively.
\+ Mean of the two best 1950 selections from 7/150.
† Mean of the four best 1950 selections from 8/290.

Geita District. Apart from mixed areas, predominantly Uk48 bordering the pure Uk48, the remainder of the Province was growing Uk46. This 1952-53 season Uk51 will cover almost all Kome Island. Pure Uk48, plus the Uk48 with some admixture of Uk46, will cover nearly half the Province; the remainder will be under Uk46.

The responses from Uk46, Uk48, and Uk51 compared with the replaced Mz561, from trials at Ukiriguru, Lubaga and district plots, are given in Tables 5 and 6. The increased yielding of the new issues is considered very satisfactory, and what is particularly pleasing is the general consistency of the yield increases over a wide range of conditions. A further yield increase in the Provincial cropping, due to strain, may be expected when Uk48 reaches general cultivation. Uk48 cropping has been well reported on in the Nyanza Province in Kenya, and at Nachingwea in the Southern Province of Tanganyika.

TABLE 6.
DISTRICT PLOTS 1952.
Yields of lint as % Uk46.

District.	*Geita*		*Mwanza (Nassa)*		*Ukerewe.*		*Kwimba.*		*Maswa.*		*Shinyanga.*	
Plot	Ibondo	Arugongo	Shigala	Bukabile	Bubima	Bulamba	Mwanangwa	Kitunga	Lalago	Somanda /	Lagana	Butulwa
Mz561	98	99	99	78	99	74	83	84	73	83	81	80
Uk46	100	100	100	100	100	100	100	100	100	100	100	100
Uk48	115	134	105	106	121	101	121	118	110	109	113	114
Uk51	98	122	116	102	120	105	109	121	120	100	133	113
ex 5/57												
7/7*	103	122	109	92	93	91	107	97	115	107	104	116
7/9*	98	123	114	94	101	106	105	116	118	116	114	131
7/14	109	134	117	99	97	106	94	109	117	115	126	122
9/10	98	123	105	100	114	106	115	117	136	129	108	122
ex 3/28												
7/150*	105	111	81	85	103	88	106	89	108	92	76	112
ex 7/150												
9/102	112	111	83	82	94	96	96	108	100	95	94	91
9/107	101	101	92	92	93	87	109	98	103	106	102	90
ex 6/318												
8/95	104	140	113	117	121	99	100	130	132	128	115	124
ex 6/320												
7/278*	136	144	102	117	119	114	104	106	110	99	105	129
8/290*	126	161	101	102	121	100	114	156	138	105	119	119
ex 6/322												
8/341*	103	123	111	86	121	93	96	108	111	100	96	120
ex 4/86												
9/117	85	129	114	110	89	96	114	111	114	126	121	124
L.S.D. (P=·05)	16	20	22	17	15	N.S.	16	20	19	16	24	25
Yield Uk46 lb. per acre seed cotton	689	1234	1061	1093	571	1282	1109	562	787	1168	1521	864
S.E. (lb. per acre)	±38	±82	±82	±66	±30	±114	±62	±38	±52	±64	±123	±74
% Grade "C"	7·2	8·5	10·7	27·6	6·0	8·0	33·5	48·0	33·8	15·3	13·7	37·5

Details of Trials:
Design 5 × 5 quadruple lattices.
Plot size: All plots except Butulwa: 5 feet (one ridge) × 50 feet.
Butulwa: 4½ feet (one ridge) × 50 feet.

* Component strains of Uk51.

The ginning percentage for Mz561 accepted for the ginning formula had been 30·75%. For Uk46 it is 32·0%. Standard bale tests for Uk46, and Uk46- -Uk48 Mxd, give a mean ginning percentage figure for all Provincial ginneries of 32·55% for commercial ginning, with 2·03% dirt, or 33·22% ex opener. (Figures from Mr. E. Drakley, B.C.G.A., Agricultural Officer and Ginnery Inspector.) 1·8% on 30·75% equals a lint increase of 5·8%. Ginning percentage variations were recorded from ginning area to ginning area.

Uk51 was grown on Kome Island by 82 growers under the guidance of Mr. C. Decker, Agricultural Assistant, Nyamahona. Seed for planting was sparingly used, and the mean yield was 850 lb./acre. There were yields of around 1,500 lb./acre; the best was just short of 2,000 lb./acre; the poorest 100-200 lb./acre. Uk51 would seem a reasonable replacement for Uk48 in the system of wave seed replacement. It has probably slightly better jassid resistance than Uk48—itself good—is possibly slightly heavier cropping, and may have slightly better spinning qualities.

Again we are very much indebted to the Shirley Institute for tests on fibre characters, spinning test reports, and reports on yarn appearance. Without such information the plant breeder's assessment of quality is dangerously incomplete. It is proposed to send to the Shirley Institute a wide range of 1952 season lint, from district plots as well as from Ukiriguru, for quality assessment.

It is proposed to issue a Uk53 for the 1953-54 season. The yield trial results of "possible" strains are shown in Tables 5 and 6. Some of the strains are very good in the field, but critical spinning assessments are now necessary.

The spinning reports on Mz561, Uk46 and Uk48 continue to show them as having the same general spinning qualities and yarn appearance. It may be that Uk51 will be slightly better—the seed cotton from the first multiplications was reported on favourably—but reports on the range of spinning tests have to be awaited.

Ukiriguru strain trial yields were poorer than in most years, especially in the valley-bottom "mbuga" trial. There was American bollworm loss and heavy bacterial blight loss. The run of district plot yields is high. One district plot on alluvial land was a failure and one, also on heavy land, a partial failure; Uk46 (control) in seven out of the remaining twelve trials yielded over 1,000 lb./acre.

The emphasis in the immediate breeding work has been switched from further selection within the segregating "Local" strains to the crossing programme for resistance to bacterial blight, crossing the best of the Ukiriguru strains with selections from Dr. Hutchinson's Albar 51. Better leaf hair (jassid resistance) is also being crossed on to outstanding Ukiriguru lots which are not up to standard for leaf hair.

A start to the crossing programme, with the Albar 51 lots, was made in-season in 1952, and continued out-of-season in 1952, the plants being hand-watered. More material than can be carried to a finish is included in the first programme, but it is hoped that considerable discarding will be possible as stocks can be faulted.

The Albar 51 lots are so incomparably better than Albar 49, that the crosses in which Albar 49 had been used have been discarded.

Pests and Diseases.

Pests.

As a generalisation for the Province, pest damage was not heavy.

At Ukiriguru there was quite serious American bollworm loss from the end of February. There was also appreciable spiny bollworm loss. Stainers, mainly *D. fasciatus,* at the end of the season were more numerous than in most years. There was an exceptionally high percentage of Grade C for Ukiriguru—around 30%. A considerable amount of staining however must have been caused by bacterial boll-rot.

Specimens of pink bollworm were found at Ukiriguru at the end of May, more than in any year previously. It was feared that there might be a pink bollworm attack on the out-of-season crossing plot, but this did not happen, although from the beginning of November onwards there was a steady migration to this plot of numbers of *D. superstitiosus.*

Pink bollworm has been reported from mainland areas near the Lake, and considerable numbers were reported in June in Western Ukerewe Island.

It is hoped, with the distribution of Uk46 and the following-up by Uk48 and Uk51, that jassid will now no longer be a major factor liable to affect the Lake Province crop. The position will be the more secure when Uk48 covers the whole Province. At Ukiriguru, even on the "Local" interlards in the strain trials, there was little jassid damage, though a line of Stoneville 20 was blasted by jassid attack.

Along the bush edge in S.W. Geita, over a considerable area, there was a blasting attack of *Helopeltis spp.* In the area affected great loss of crop was suffered.

At Nachingwea in the Southern Province, in the O.F.C. area, red bollworm larvae (*Diparopsis castanea*) were reported at the end of May, from the small area of cotton growing there.

Diseases.

Bacterial Blight (*Xanthomonas malvacearum*).—During the 1951-52 season, bacterial blight was widespread in the Province and was

especially severe where the crop was grown on poor soils, and where cotton had been grown in successive seasons on the same land.

At Ukiriguru, the disease was much more severe than has previously been experienced, climatic conditions being favourable for its spread. In the past, acid delinting of seed has apparently provided effective control of seed-borne infection. With the absence of a build-up of trash as a secondary source of infection, a condition which obtained whilst the station was developing and new land was continually being opened up, this control by acid treating has generally been sufficient.

This season, cotton bulks sown with acid treated seed showed fewer stem lesions on the young plants than neighbouring bulks sown with untreated seed; but high lesion counts were found even where seed had been acid treated, on land continuously planted to cotton. A break of one or two years under millet seemed to give some control (see Table 4).

During a survey of the phosphate distribution area on Ukerewe Island the effect of crop rotation was very striking. Cotton following cassava or fallow was much more vigorous and freer from bacterial blight than on land which had been carrying cotton for a number of seasons.

In view of the increasing interest in seed-borne infection, a trial involving eleven seed treatments was laid down. A comparison of the treated plots with the controls showed a marked reduction in cotyledon lesions. The percentage of infected seedlings in the treated plots was from 4 to 19 as against 53 per cent. natural infection in the controls.

The differences between individual treatments were not statistically significant. The indications were, however, that acid delinting and treatment with mercurial dusts were more effective than copper dusts. This agrees with results in Uganda, the Sudan, and French Equatorial Africa. From seed which had been infected with bacterial suspension, the control plot showed 96% seedling infection whilst the plots treated with mercurial dusts showed 3% and 4% infection, as against 8% and 15% in those treated with copper dusts. (Samples of YF2776 and Agrosan GN5 used in this experiment were kindly provided free of charge by Plant Protection Ltd.)

Both seed-borne and trash-borne infection are thus important under Lake Province conditions: the one can be controlled by seed dusting, the other by rotation. It would be unwise to expect effective control from seed-dusting alone.

Largely as a result of the success achieved in Uganda, the introduction of seed dusting on a commercial scale is proceeding rapidly in the Province. Acting for the Lake Province Cotton Committee, the

Regional Assistant Director of Agriculture, Mwanza, (by arrangement with Mr. Jameson, Senior Research Officer, Kawanda) sent 200 tons of Uk48 seed to the Uganda Co., Kampala, for Perenox treatment. This is being planted in hill sand areas, on land which has not recently carried cotton. The resultant crops should form an interesting comparison with those grown from untreated seed.

The Lake Province Cotton Committee proposes to instal one Booth Drum Mixer for the 1953-54 season, and orders for mixers are being placed independently by Lake Province ginners.

Work on breeding varieties resistant to bacterial blight is continuing. Hybrid seed for planting in the coming season is being treated with *Xanthomonas* inoculum and will be planted on land which has borne heavily infected crops in the past. The segregating progenies will be inoculated, using Dr. Wickens' needle-prick technique.

Wilt Disease.—A wilt disease with symptoms similar to those of *Verticillium* wilt occurred in the cotton variety trial at Lubaga. Subsequently other affected plants were discovered in nearby native shambas, chiefly in late planted cotton. At Lubaga the wilt seemed to die out towards the end of the season. Identification of the pathogen has not yet been possible.

APPENDIX.

Origin and Special Characteristics of the Main Cotton Strains Mentioned.

Lake Province "Local".	The commercial cotton in the Province prior to the issue of Mz561—mainly of Uganda Local origin.
Mz561	A straight selection from "Local" first multiplied in the 1946-47 season.
Uk48	A seed issue made up of four strains, of better jassid resistance than Uk46. It was issued for the 1948-49 season.
Uk51	A seed issue made up of seven strains, with jassid resistance; first issued for the 1951-52 season.
3/28.	Ex Mz561.
4/86.	Ex 1/45, ex Mz561; a constituent of Uk46.
5/57.	A derivative of 3/17, itself a straight selection from "Local".
6/318.	Ex 4/35, itself a derivative of Mz561.
6/320 6/322	Ex 4/35, cousin strains of 6/318.
7/150.	Ex 3/28; high jassid resistance.
"Albar" 49 "Albar" 51	General terms for 1949 and 1951 selections from Nigerian Allen, highly resistant to bacterial blight; ex Dr. J. B. Hutchinson.
Stoneville 20.	An American variety resistant to bacterial blight; ex Namulonge.

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